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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/800,751	03/07/2001	Alexander Douglas Mossman	12689US02	4759

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EXAMINER

RUTHKOSKY, MARK

ART UNIT	PAPER NUMBER
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1745

DATE MAILED: 07/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/800,751

Applicant(s)

MOSSMAN, ALEXANDER
DOUGLAS

Examiner

Mark Ruthkosky

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 April 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 22-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 22-37 is/are allowed.
- 6) ☒ Claim(s) 38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

The drawings filed on 4/19/2004 are approved.

Specification

The amended title of the invention, "Membrane Exchange Humidifier for a Fuel Cell" is approved, as it is clearly indicative of the invention to which the electrode claims are directed.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claim 38 stands rejected under 35 U.S.C. 102(e) as being anticipated by Voss et al. (US 6,106,964.)

The instant claims are to a solid polymer fuel cell system comprising a solid polymer fuel cell and an apparatus for humidifying a reactant gas supply stream, said fuel cell having a reactant gas inlet port and a reactant gas exhaust port, said humidifying apparatus comprising a membrane exchange humidifier comprising a supply stream chamber having an inlet and an outlet with the inlet having a reactant gas fluidly connected thereto and the outlet fluidly

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connected to the fuel cell reactant gas inlet port; an exhaust stream chamber having an inlet fluidly connected to the fuel cell reactant gas exhaust port; and a water permeable membrane separating the supply stream chamber and the exhaust stream chamber whereby water is transferred across the membrane from the reactant gas exhaust to the reactant gas supply stream.

Voss et al. (US 6,106,964) teaches an assembly where water vapor from a fuel cell exhaust is used to humidify a reactant gas supply stream that is on the opposite side of a water permeable membrane (see fig. 1, col. 9, and col. 13, lines 1-15.) The stream to be humidified may be an oxidant or fuel stream (see col. 4, lines 29-47.) The membrane is made of cellulose or perfluorosulfonic acid. The water is transferred across the membrane by a partial pressure difference (see col. 7, lines 32-45.) The humidifier configuration of the reference (figures 1-6, and col. 11-12) is the same as in the instant application/figures. Plates, frames, manifolds, seals, ridges and depressions are noted (in Figure 5 and column 11.) Alternative constructions are noted in col. 12, lines 20-65. Ports are located in the frames and the membranes (figure 5.) Thus, the claim is anticipated.

Claim Rejections - 35 USC § 103

The rejection of claims 22-37 under 35 U.S.C. 103(a) as being unpatentable over Voss et al. (US 6,106,964) in view of Debe (US 5,910,378) is withdrawn. The Voss reference teaches that the membranes are impermeable to reactant gasses when dry (see col. 9, lines 45-60.) This is further shown in the instant application on page 33, (Table 2.)

Allowable Subject Matter

Claims 22-37 are allowed.

The following is an examiner's statement of reasons for allowance:

The instant claims are to a solid polymer fuel cell system comprising a solid polymer fuel cell and an apparatus for humidifying a reactant gas supply stream, said fuel cell having a reactant gas inlet port and a reactant gas exhaust port, said humidifying apparatus comprising a membrane exchange humidifier comprising a supply stream chamber having an inlet and an outlet with the inlet having a reactant gas fluidly connected thereto and the outlet fluidly connected to the fuel cell reactant gas inlet port; an exhaust stream chamber having an inlet fluidly connected to the fuel cell reactant gas exhaust port; and a water permeable membrane separating the supply stream chamber and the exhaust stream chamber whereby water is transferred across the membrane from the reactant gas exhaust to the reactant gas supply stream. The membrane comprises a microporous polymer and a hydrophilic additive. When dry the membrane is substantially permeable to at least one component of at least one of the reactant gas supply and exhaust streams. The prior art does not teach a solid polymer fuel cell system comprising a solid polymer fuel cell and an apparatus for humidifying a reactant gas supply stream wherein the apparatus includes a water permeable membrane comprising a microporous polymer and a hydrophilic additive separating the supply stream chamber and the exhaust stream chamber whereby water is transferred across the membrane from the reactant gas exhaust to the reactant gas supply stream such that the membrane is substantially permeable, when dry, to at least one component of at least one of the reactant gas supply and exhaust streams.

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Voss et al. (US 6,106,964) teaches an assembly where water vapor from a fuel cell exhaust is used to humidify a reactant gas supply stream that is on the opposite side of a water permeable membrane (see fig. 1, col. 9, and col. 13, lines 1-15.) The stream to be humidified may be an oxidant or fuel stream (see col. 4, lines 29-47.) The membrane is made of cellulose or perfluorosulfonic acid. These membranes are microporous membranes as well described in the art. The water is transferred across the membrane by a partial pressure difference (see col. 7, lines 32-45.) The relationships between dew points and temperature are taught in cols. 14-16. The humidifier configuration of the reference (figures 1-6, col. 11-12) is the same as in the instant figures. Plates, frames, manifolds, seals, ridges and depressions are noted (in Figure 5 and column 11.) Bundle constructions are noted in col. 12, lines 20-65. The Voss reference does not teach the addition of a hydrophilic additive to the water permeable membrane. Further, the Voss reference teaches that the membranes are impermeable to gasses when dry (see col. 9, lines 45-60.) This is further shown in the instant application on page 33, (Table 2.)

Debe (US 5,910,378) teaches a porous polymer membrane film as a backing layer for a membrane electrode/electrolyte assembly. The membrane may be high-density polyethylene with an additive (col. 8, lines 45-60.) The material transfers water vapor across the assembly to allow for continued humidification of the electrolyte assembly (col. 3, lines 28-44 and col. 6, lines 44-end.) The pore sizes of the membrane are between about 0.01 and 10 μm (col. 6, lines 44-col. 7, line 15.) Porosity may be greater than 50% (col. 16, lines 18-33.) Fillers, including silica, may be added (col. 7.) The reference does not teach the material to be used in a solid polymer fuel cell with an apparatus for humidifying a reactant gas supply stream. As the prior art does not teach a solid polymer fuel cell system comprising a solid polymer fuel cell and an

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apparatus for humidifying a reactant gas supply stream, as claimed, the claims are allowed. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

Applicant's arguments filed 4/9/2004 have been fully considered but they are not persuasive. The applicant argues that the prior art reference to Voss does not teach a seal disposed between the membrane and the frame such that at least one of the seals consists essentially of a bond formed between the membrane and the upper and lower frames. In column 11, lines 10-35, the Voss reference teaches that the membrane layer is pressed and sealed between a sealing ridge and a sealing depression when assembled. A bond is formed between the frames and the membrane as the assembly is taught to provide fluid tight sealing. There is no limitation in the claims as to the bond formed between the plates. The materials are bonded by compression between the membrane and the frame to seal the assembly.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Examiner Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 571-272-1291. The examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-6:30.) If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mark Ruthkosky

Primary Patent Examiner

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Mark Ruthkosky 7/6/04